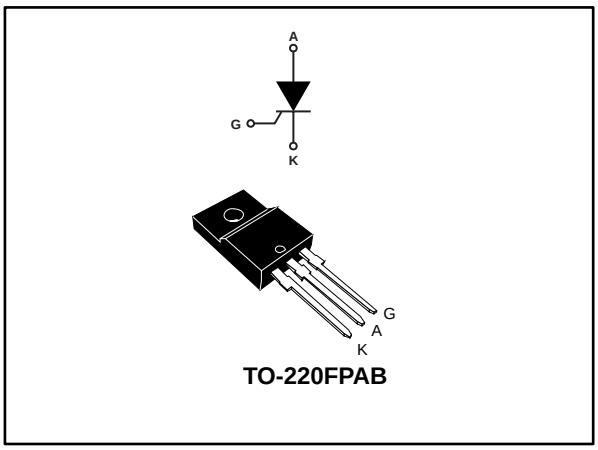
TN2010H-6FP

High temperature 20 A SCRs

Datasheet - production data



TO-220FPAB

Features

- High junction temperature: T_j = 150 °C
- High noise immunity dV/dt = 400 V/µs up to 150 °C
- Gate triggering current I_{GT} = 10 mA
- Peak off-state voltage V_{DRM}/V_{RRM} = 600 V
- High turn-on current rise dI/dt = 100 A/µs
- ECOPACK®2 compliant component
- TO-220FPAB insulated package:
  - Complies with UL standards (File ref: E81734)
  - Insulated voltage: 2000 V_{RMS}

Applications

- Motorbike voltage regulator circuits
- Inrush current limiting circuits
- Motor control circuits and starters
- Light dimmers
- Solid state relays

Description

Packaged in an insulated TO-220FPAB, this device offers high thermal performance during operation of up to 20 A_{RMS}, thanks to a junction temperature of up to 150 °C.

This insulated fullpack package allows a back to back configuration.

The combination of noise immunity and low gate triggering current allows to design strong and compact control circuits.

Table 1: Device summary

Order code	Package	V_{DRM}/V_{RRM}	I_{GT}
TN2010H-6FP	TO-220FPAB	600 V	10 mA

1 Characteristics

Table 2: Absolute maximum ratings (limiting values), T_j = 25 °C unless otherwise specified

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (180 ° conduction angle)		T_c = 80 °C	20	A
$I_{T(AV)}$	Average on-state current (180 ° conduction angle)		T_c = 80 °C	12.7	A
			T_c = 99 °C	10	
			T_c = 112 °C	8	
I_{TSM}	Non repetitive surge peak on-state current (T_j initial = 25 °C)		t_p = 8.3 ms	197	A
			t_p = 10 ms	180	
I^2t	I^2t value for fusing		t_p = 10 ms	162	A^2s
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT}, tr ≤ 100 ns		f = 60 Hz	100	A/µs
V_{DSM}/V_{RSM}	Non repetitive surge peak off-state voltage		t_p = 10 ms	700	V
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 150 °C	4	A
$P_{G(AV)}$	Average gate power dissipation		T_j = 150 °C	1	W
T_{stg}	Storage junction temperature range			-40 to +150	°C
T_j	Operating junction temperature range			-40 to +150	°C
T_L	Maximum lead temperature for soldering during 10 s			260	°C
$V_{INS(RMS)}$	Insulation RMS voltage, 60 seconds			2000	V

Table 3: Electrical characteristics (T_j = 25 °C unless otherwise specified)

Symbol	Test conditions			Value	Unit
I_{GT}	V_D = 12 V, R_L = 33 Ω		Typ.	5	mA
			Max.	10	
V_{GT}			Max.	1.3	V
V_{GD}	V_D = V_{DRM}, R_L = 3.3 kΩ	T_j = 150 °C	Min.	0.1	V
I_H	I_T = 500 mA, gate open		Max.	40	mA
I_L	I_G = 1.2 x I_{GT}		Max.	60	mA
dV/dt	V_D = 402 V, gate open	T_j = 150 °C	Min.	400	V/µs
t_{gt}	I_{TM} = 40 A, V_D = 402 V, I_G = 20 mA, (dI_G/dt) max = 0.2 A/µs		Typ.	1.9	µs
t_q	I_{TM} = 40 A, V_D = 402 V, (d_I/dt)off = 30 A/µs, V_R = 25 V, dV_D/dt = 40 V/µs	T_j = 150 °C	Typ.	70	µs

Table 4: Static characteristics

Symbol	Test conditions			Value	Unit
V_{TM}	I_{TM} = 40 A, t_p = 380 µs	T_j = 25 °C	Max.	1.6	V
V_{TO}	Threshold voltage	T_j = 150 °C	Max.	0.82	
R_D	Dynamic resistance	T_j = 150 °C	Max.	17.5	mΩ
I_{DRM}, I_{RRM}	$V_D = V_{DRM}$, $V_R = V_{RRM}$	T_j = 25 °C	Max.	5	µA
		T_j = 125 °C		2	mA
		T_j = 150 °C		3.9	

Table 5: Thermal parameters

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (DC)	Max.	4.0	°C/W
$R_{th(j-a)}$	Junction to ambient (DC)	Typ.	60	

1.1 Characteristics (curves)

Figure 1: Maximum power dissipation versus average on-state current

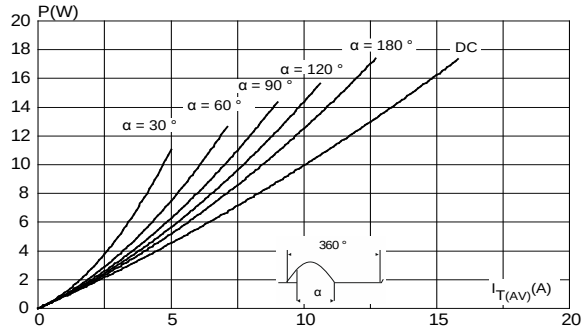


Figure 2: Average and DC on-state current versus case temperature

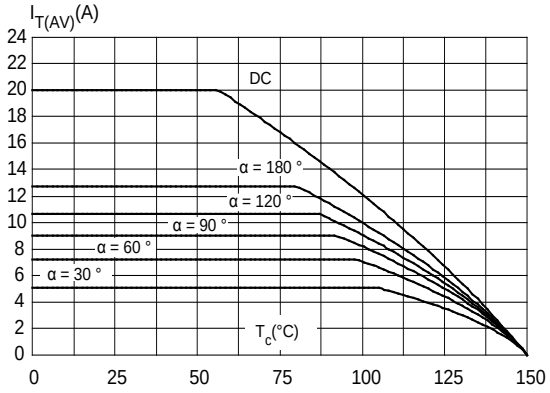


Figure 3: Average and D.C. on state current versus ambient temperature

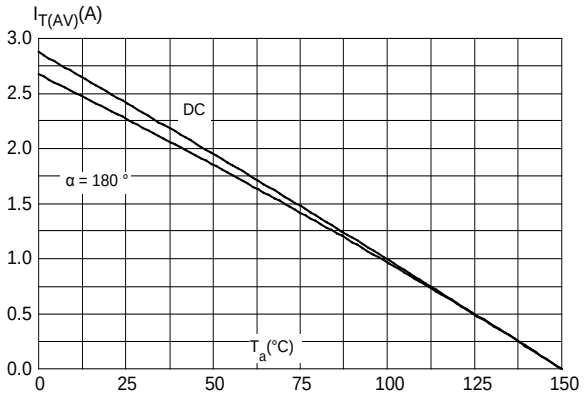


Figure 4: Relative variation of thermal impedance versus pulse duration

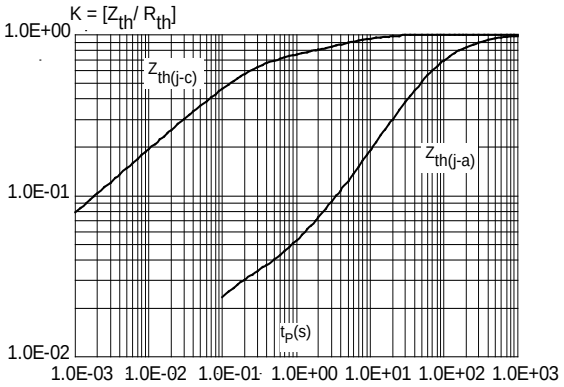


Figure 5: Relative variation of gate triggering current and gate voltage versus junction temperature (typical values)

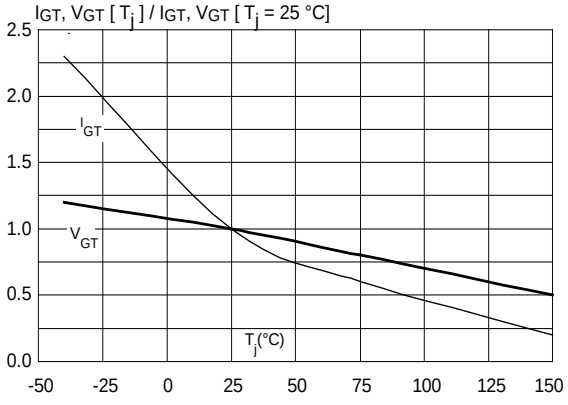


Figure 6: Relative variation of holding and latching current versus junction temperature (typical values)

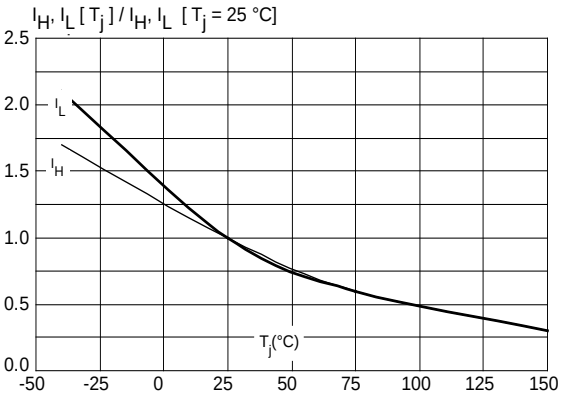


Figure 7: Relative variation of static dV/dt immunity versus junction temperature (typical values)

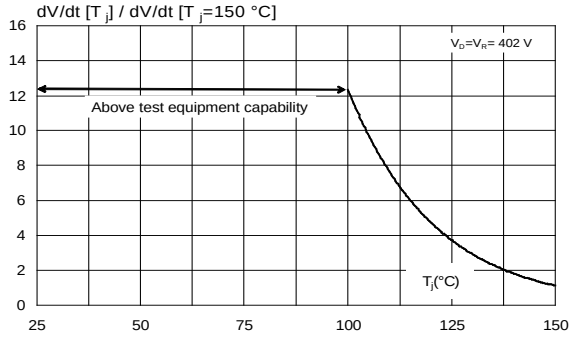


Figure 8: Surge peak on-state current versus number of cycles

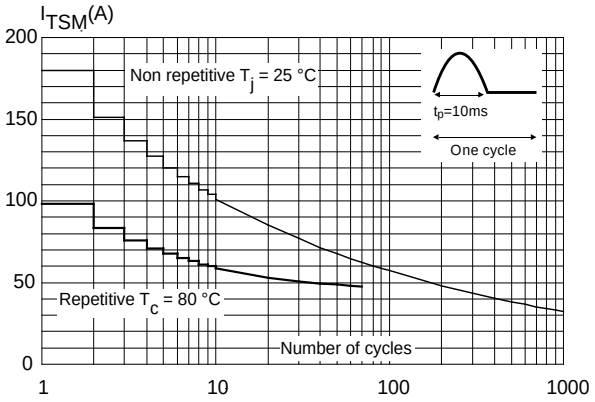


Figure 9: Non repetitive surge peak on-state current for a sinusoidal pulse with width t_p < 10 ms

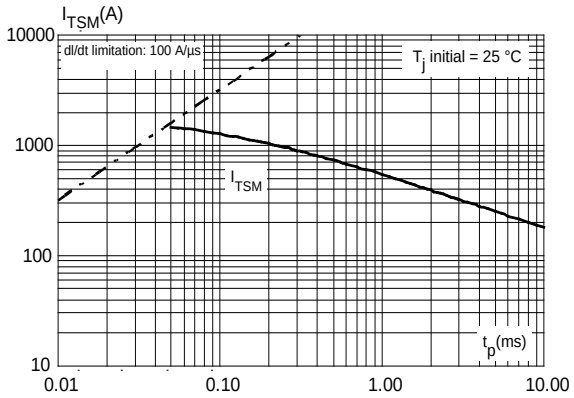


Figure 10: On-state characteristics (maximum values)

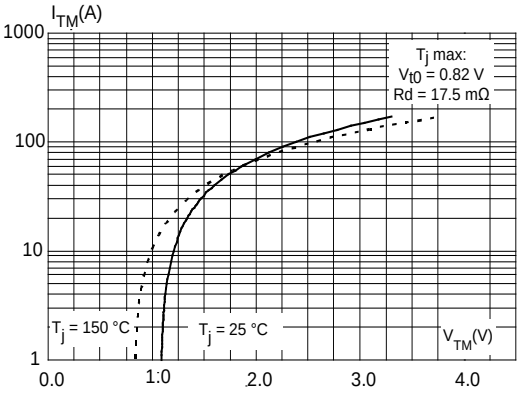
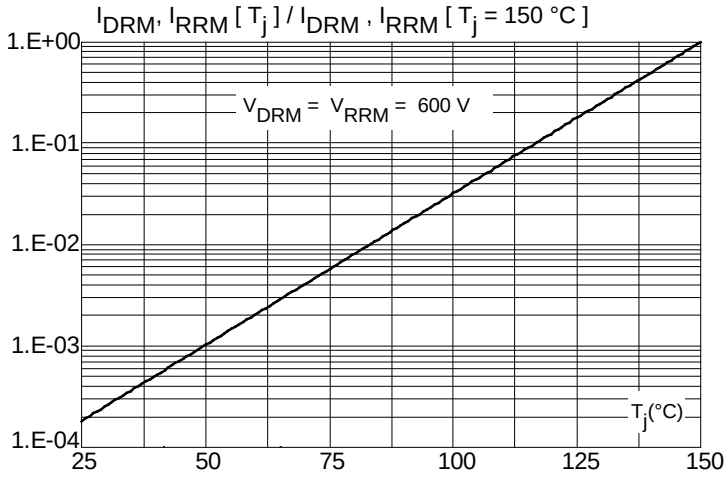


Figure 11: Relative variation of leakage current versus junction temperature



2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: ***www.st.com***. ECOPACK® is an ST trademark.

- Epoxy meets UL94, V0
- Lead-free, halogen-free package
- Recommended torque value (TO-220FPAB): 0.4 to 0.6 N.m

2.1 TO-220AB package information

Figure 12: TO-220FPAB package outline

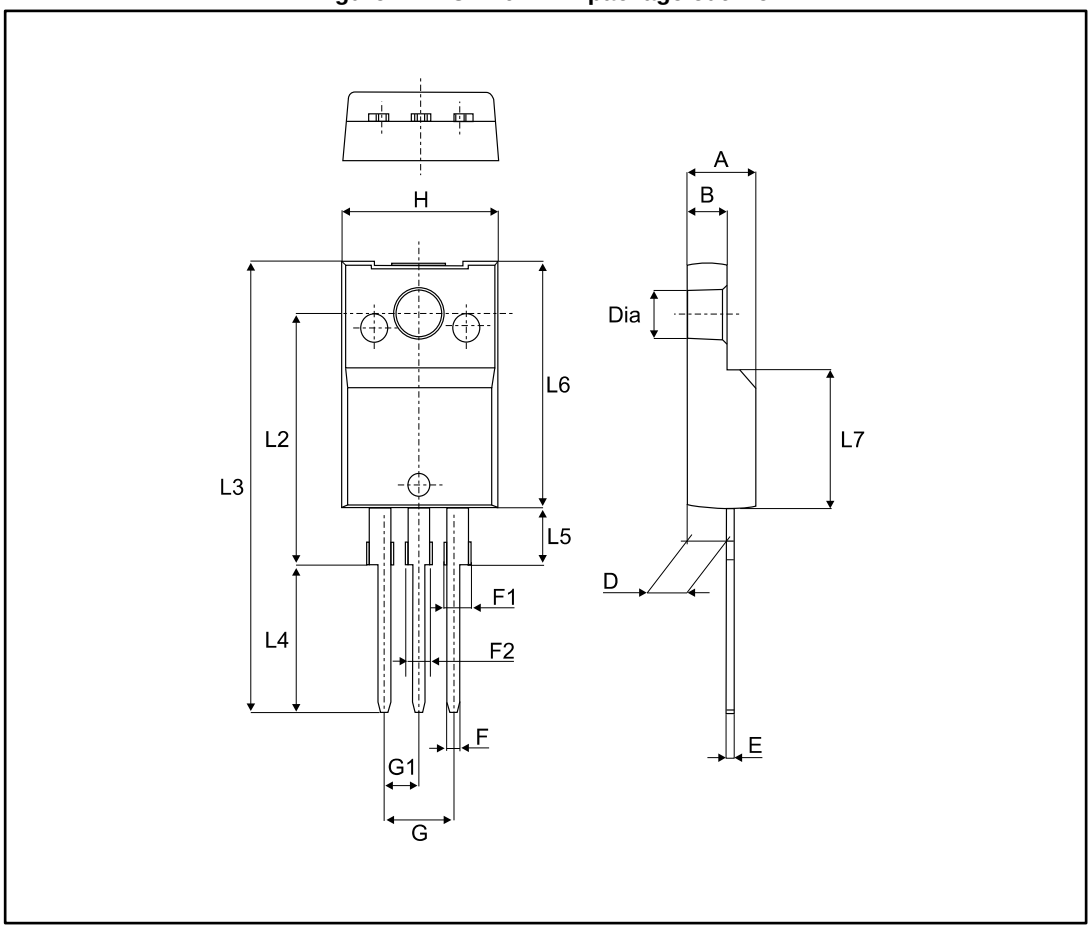


Table 6: TO-220FPAB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.1739	0.1818
B	2.5	2.7	0.0988	0.1067
D	2.50	2.75	0.0988	0.1087
E	0.45	0.70	0.0178	0.0277
F	0.75	1.0	0.0296	0.0395
F1	1.15	1.70	0.0455	0.0672
F2	1.15	1.70	0.0455	0.0672
G	4.95	5.20	0.1957	0.2055
G1	2.40	2.70	0.0949	0.1067
H	10.00	10.40	0.3953	0.4111
L2	16.00 typ.		0.6324 typ.	
L3	28.60	30.60	1.1304	1.2095
L4	9.80	10.6	0.3874	0.4190
L5	2.90	3.60	0.1146	0.1423
L6	15.90	16.40	0.6285	0.6482
L7	9.00	9.30	0.3557	0.3676
Dia	3.0	3.20	0.1186	0.1265

3 Ordering information

Figure 13: Ordering information scheme

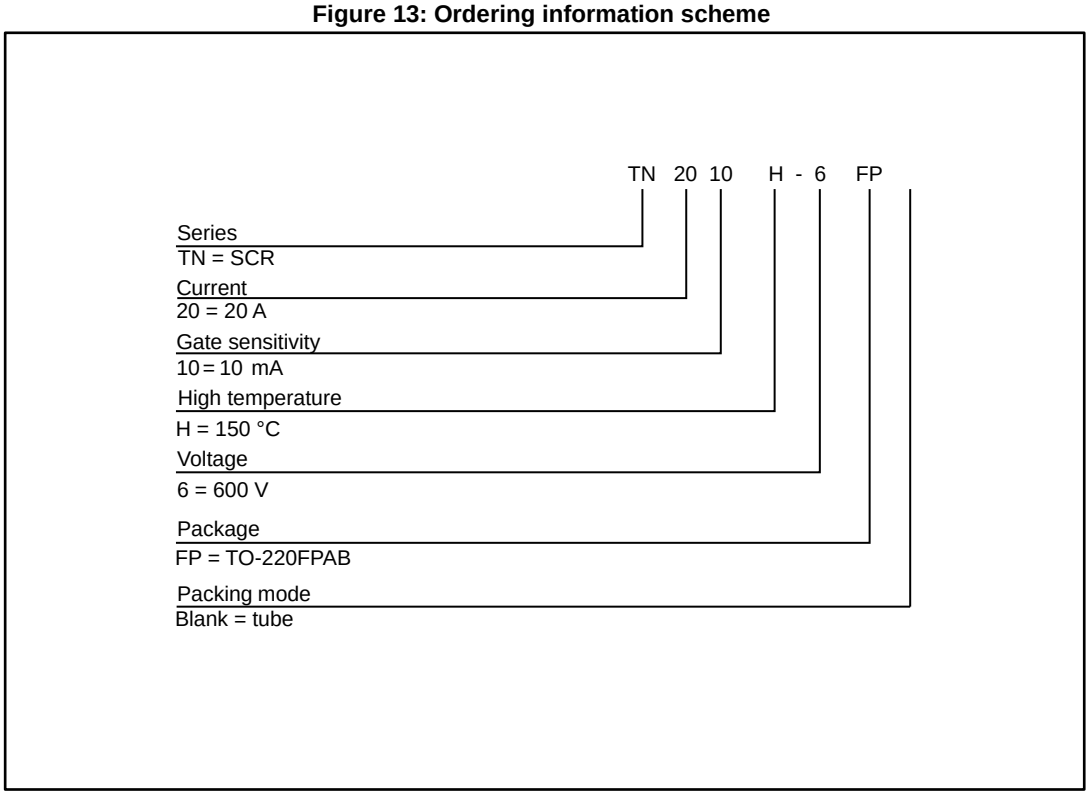


Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
TN2010H-6FP	TN2010H6	TO-220FPAB	2.0 g	50	Tube

4 Revision history

Table 8: Document revision history

Date	Revision	Changes
01-Aug-2017	1	Initial release.

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